

H Y M N
TO THE
CREATOR of the World.

The THOUGHTS taken chiefly from
PSALM civ.

To which is added, in Prose,

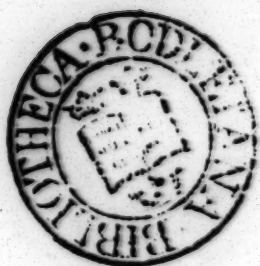
A N
IDEA of the CREATOR
FROM HIS
WORKS.

The SECOND EDITION.

*Te rerum Deus alme canam, dominumque, patremque,
Magne parens, sancta quam majestate verendus
Ætheris æternas rector moliris habenas !*

BUCHAN. Ps. civ.

L O N D O N :
Printed in the Year MDCCL.

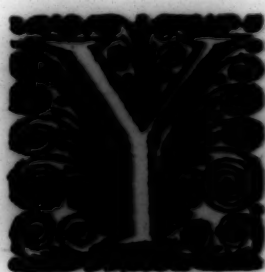




T O

George Lyttelton, *Esq;*

S I R,



YOU will probably be surprized at a public address from an anonymous writer, whose work you will have no opportunity of seeing, till it be in print. The presumption of this unexpected dedication may perhaps be blamed: But the propriety of desiring the countenance of a

gentleman distinguished for a pious and a charitable turn of mind, as well as for a true poetical genius, to a sacred poem, published on a charitable account, is what hardly any one is likely to dispute.

Flattery, the usual matter of dedications, or even the most simple detail of the particulars of your character, the author thinks unfit for his pen, as well as for your ear. Therefore, after most humbly begging your pardon for this intrusion, and just mentioning, that this will be presented you by those who can certify you of the truth of the pretensions in the following advertisement; there is nothing farther to be added by one, who is, and is likely to continue unknown to you, but to pray, that Heaven may bless you with health and happiness in this world, and crown you hereafter with those distinguished honours promised to such as stand up for the cause of truth in these corrupt times,

when

DEDICATION.

iii

when others strive to outvie one another in discountenancing it.

That you will be so kind as to take in good part these sincere and disinterested wishes, is the desire and hope of,

S I R,

Your most obedient

Most humble Servant,

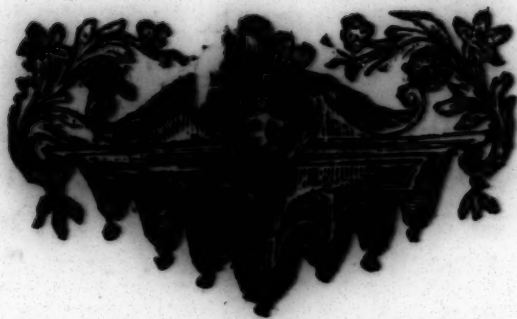
The AUTHOR.

ADVERTISEMENT.

TH E following poem was the amusement of some leisure hours in the country several years ago. It was not originally intended for the press ; nor had ever seen the light, had it not been for some friends of the author's, who, being desirous to have it in print, and having often, in vain, requested his consent, for that purpose, at length prevailed by proposing to him the publishing it for the benefit of a very amiable child, an orphan. His regard for the family, to which the child belongs, and the slenderest prospect of having it in his power to do a kind action with so little trouble, were considerations he could not resist. It was therefore thought proper to revise and improve the poem, and to add the notes and treatise annexed, that the whole might be somewhat the more worthy of the public, and the more likely to turn to some advantage to the child. His relations will think themselves bound to return those acknowledgements, he
is

ADVERTISEMENT.

is not at present capable properly to make, to the promoters of the sale of this piece, who may consider every shilling so laid out, not as bestowed merely for entertainment, but as a charity to a tender and helpless innocent, whose prospect in life has been one of the fairest, though now changed for the worse, and to whose amiable appearance very few could refuse such a small gratuity, were he to present them the books himself.



A N

HYMN to the CREATOR:

- 1 **A** Wake, my soul ! with joy thy God adore ;
 Declare his greatness ; celebrate his pow'r ;
 Who, cloath'd with honour, and with
 glory crown'd,
 Shines forth, and cheers his universe around.
- 2 Who with a radiant veil of heavenly light
 Himself conceals from all created sight.
 Who rais'd the spacious firmament on high,
 And spread the azure curtain of the sky.

P S A L. CIV.

Ver. 1. Bless the Lord, O my soul ! O Lord, my God, thou art very great, thou art clothed with honour and majesty.

2. Who coverest thyself with light as with a garment : who stretchest out the heavens like a curtain.

N O T E S.

Ver. 2. Who with a radiant veil, &c.] Some ingenious writers have considered the sun as one of the fittest emblems of the supreme being ; though all created glories must fall infinitely short of the creator of those glories. As the sun appears to us unequalled in splendor and majesty ; as his body is concealed by the brightness that surrounds him ; as he is removed from us at an inconceivable distance ; as he beholds all things ; and as he is the soul and life of our system ; in the same manner, but in a degree infinitely higher, may we conceive of the unequalled majesty of the One Supreme.

Ibid. Himself conceals, &c.] It is certain, that a spirit absolutely pure, and free from all manner of material or bodily substance, as without all doubt the divine nature, and perhaps no other in the universe, is, must necessarily be invisible, and not to be any way apprehended, but by abstract Reason.

P. B. 44.

3 Whose

A N H Y M N

- 3 Whose awful throne heav'n's starry arch sustains,
Whose presence not heav'n's vast expanse restrains.
Whose ways unsearchable no eye can find,
The clouds his chariot, and his wings the wind.
- 4 Whom hosts of mighty angels own their Lord,
And flaming seraphim fulfil his word.
- 5 Whose pow'r of old the solid earth did found,
Self pois'd, self-centred, and with strength girt round;
From her appointed sphere forbid to fly,
Or rush unbalanc'd through the trackless sky.
To reas'ning man the sov'reign rule assign'd,
His delegate o'er each inferior kind;
Too soon to fall from that distinguish'd place,
His honours stain'd with guilt and foul disgrace.
- 6 He saw the pride of earth's aspiring Lord,
And in his fury gave the dreadful word:
Straight o'er her peopled plains his floods were pour'd,
And o'er her mountains the proud billows roar'd.

P S A L. CIV.

- | | |
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| <p>3. Who layeth the beams
of his chambers in the waters;
who maketh the clouds his
chariot; who walketh upon
the wings of the wind.</p> | <p>5. Who laid the founda-
tions of the earth, that it
should not be moved for ever.</p> |
| <p>4. Who maketh his angels
spirits; his ministers a flam-
ing fire.</p> | <p>6. Thou coveredst it with
the deep as with a garment:
the waters stood above the
mountains.</p> |

N O T E S.

Ver. 3. *Whose awful throne, &c.*] Though the essence of the Supreme Being be necessarily invisible, as has been said, yet he has thought it proper by a visible glory, to represent his immediate presence: And though he inhabits equally the whole immensity of space, yet he has thought fit to place the throne of his majesty in heaven. See *Isa. lxi. 1.* "Thus saith the Lord, the heaven is my throne, and the earth my footstool."

Ibid. Whose presence, &c.] "The heaven and heaven of heavens cannot contain thee." *1 Kingsviii. 27.*

Ibid. Whose ways unsearchable, &c.] "How unsearchable are his judgments, and his ways past finding out!" *Rom. xi. 33.*

Athwart

TO THE CREATOR:

3

- Athwart the face of earth the deluge sweeps,
And whelms the impious nations in the deeps.
7 Again God spake—and at his pow'rful call
The raging floods aswage, the waters fall,
The tempests hear his voice, and straight obey,
And at his thunder's roar they haste away :
8 From off the lofty mountains they subside,
And gently through the winding vallies glide,
Till in the spacious caverns of the deep
They sink together, and in silence sleep.
9 There he hath stretch'd abroad their liquid plains,
And there omnipotence their rage restrains,
That earth no more her ruins may deplore,
And guilty mortals dread their wrath no more.
10 He bids the living fountains burst the ground,
And bounteous spread their silver streams around :
Down from the hills they draw their shining train,
Diffusing health and beauty o'er the plain.

P S A L. CIV.

- | | |
|---|--|
| 7. At thy rebuke they fled :
at the voice of thy thunder
they hasted away. | 9. Thou hast set a bound
for them, that they may not
pass over : that they turn not
again to cover the earth. |
| 8. They go up by the
mountains : they go down by
the vallies unto the place
which thou hast founded for
them. | 10. He sendeth the springs
into the vallies, which run
among the hills. |

N O T E S.

Ver. 9. *And there omnipotence, &c.*] “ Hitherto shalt, thou come,
“ but no farther ; and here shall thy proud waves be stayed.” *Job*
xxxviii. 11.

Ibid. That earth no more, &c.] “ I set my bow in the clouds,
“ and it shall be for a token, &c. — and the waters shall no more
“ become a flood to destroy all flesh.” *Gen. ix. 13—15.*

Ver. 10. *Down from the hills, &c.*] It is by most authors
agreed, that the hills are the cause of springs, and the origin of
rivers, by their attracting and condensing the vapours in the air,
by their raising up the moisture that is in the earth, by means of
attraction, and refining and filtering it through their pores, and by
giving the rivers a fall or declivity to enable them to run down
into the vallies.

- 11 There the fair flocks allay the summer's rage,
And panting savages their flame aswage.
- 12 On their sweet winding banks th' aerial race
In artless numbers warble forth his praise,
Or chant the harmless raptures of their loves,
And cheer the plains, and wake the vocal groves.
- 13 Forth from his treasures in the skies he pours
His precious blessings in refreshing show'rs.
Each dying plant with joy new life receives,
And thankful nature smiles, and earth revives.
- 14 The fruitful fields with verdure he bespreads,
The table of the race that haunts the meads,
And bids each forest, and each flow'ry plain
Send forth their native phyfic for the swain.
Thus doth the various bounty of the earth
Support each species crowding into birth.

P S A L. CIV.

11. They give drink to every beast of the field: the wild asses quench their thirst. from his chambers: the earth is satisfied with the fruit of thy works.
12. By them the fowls of heaven have their habitation, which sing among the branches. 14. He causeth the grass to grow for the cattle, and herb for the service of man: that he may bring forth food out of the earth.
13. He watereth the hills

N O T E S.

Ver. 13. *Each dying plant, &c.*] It is found by experiments, that pure water will nourish any vegetable. For, setting a plant, or seed in a pot, containing a known quantity of earth, and watering it constantly, after it is grown to a thousand times its original weight, the quantity of earth is found by weighing it, not in the least diminished. Therefore it is to the moisture taken in by the roots and leaves of plants, trees, and grain, that we owe their growth; so that, whatever we may think, a seasonable shower of rain is more valuable to us than a shower of gold.

TO THE CREATOR.

5

- 15 In purple streams she bids her vintage flow,
 And olives on her hills luxuriant grow,
 One with its gen'rous juice to cheer the heart;
 And one illustrious beauty to impart;
 And bread of all heav'n's precious gifts the chief,
 From desolating want the sure relief,
 Which with new life the feeble limbs inspires,
 And all the man with health and courage fires.
- 16 The cloud-topt hills with waving woods are
 crown'd,
 Which wide extend their sacred shades around.
 There *Lebanon's* proud cedars nod their heads;
 There *Basban's* lofty oaks extend their shades:
- 17 The pointed firs rise tow'ring to the clouds,
 And life and warbling numbers fill the woods.

P S A L. CIV.

- | | |
|---|---|
| <p>15. And wine, that maketh glad the heart of man, and oil to make his face to shine, and bread, which strengthneth man's heart.</p> | <p>are full of sap: the cedars of <i>Lebanon</i>, which he hath planted.</p> |
| <p>16. The trees of the Lord</p> | <p>17. Where the birds make their nests: as for the stork, the fir-trees are her house.</p> |

N O T E S.

Ver. 15. *One with its gen'rous juice to cheer the heart.*] Not to stupify or bring madness; which is a gross abuse of the good creature of God.

Ibid. And bread, &c.] It is remarkable, that there is hardly a nation upon earth, that does not use some kind of bread, whereas there are very considerable parts of the world, in which no kind of flesh is eaten. The principal property of bread, which renders it so healthful, seems to be the strong dissolving quality it possesses, by which it tends so much to promote digestion. Mr. *Boyle* extracted from a small quantity of bread, a liquor strong enough to dissolve in part corals, blood-stones, and other extremely hard substances. There is no greater instance of the divine wisdom in the provision he has made for the support of the lives of his creatures, than appears in the hardness of wheat and other grain necessary to life, which are made to stand almost all weathers, and to thrive with very little culture. If wheat and barley required as much care to bring them forward, and were as delicate as apricots and peaches, we must have a continued famine.

18 Nor

A N H Y M N

- 18 Nor gentle shades alone, nor verdant plains,
 Nor fair enamel'd meads, nor flow'ry lawns,
 But e'en rude rocks and dreary desarts yield
 Retreats for the wild wand'rers of the field.
 Thy pow'r with life and sense all nature fills,
 Each element with varied beings swells,
 Race after race arising view the light,
 Then silent pass away, and sink in night.
 The gift of life thus boundlessly bestow'd,
 Proclaims th' exhaustless hand, the hand of God.
- 19 Nor less thy glory in th' etherial spheres,
 Nor less thy ruling providence appears.
 There from on high the gentle moon by night
 In solemn silence sheds her silver light,

P S A L. CIV.

18. The high hills are a 19. He appointeth the moon
 refuge for the wild-goats, and for seasons: the sun knoweth
 the rocks for the coney's. his going down.

N O T E S.

Ver. 18. *Each element, &c.*] There is hardly any substance in nature, that is not the habitation and receptacle of some one or more species of living creatures. Every different plant nourishes its proper family of insects. All kinds of substances when turned to a state of corruption, swarm with life. The air is plainly an inexhaustible store of eggs, or stamina of animalcules of different kinds: for one cannot set in the sun-beams for any considerable time, a little paste, infusion of pepper, hay, flowers, leaves, or almost any vegetable substance, but it shall be impregnated with thousands and millions of animalcules imperceptible without a microscope; all of different forms, sizes, and manners of life, and all completely and elegantly formed in all their parts.

Ibid. Then silent pass away, &c.] To beings, who have no desire or prospect of immortality, a privation of existence is no hardship; as on the contrary, to suppose our species, with the pleasing hope of an everlasting state hereafter, which is inseparable from our nature, not to have been designed for immortality, would be giving a very indifferent representation of the wisdom and goodness of him, who implanted in our minds those hopes and desires.

And

TO THE CREATOR. 7

And thence the glorious sun pours forth his beams,
Thence copious spreads around his quick'ning
streams.

Each various orb enjoys the golden day,
And worlds of life hang on his chearful ray.

20 Thus light and darkness their fix'd course maintain,
And still the kind vicissitudes remain :

For when pale night her sable curtain spreads,

And wraps all nature in her awful shades,

Soft slumbers gently seal each mortal eye,

Stretch'd at their ease the weary lab'ers lie.

The restless soul 'midst life's vain tumults tost,

Forgets her woes, and ev'ry care is lost.

Then from their dens the rav'nous monsters creep,

Whilst in their folds the harmless bestial sleep.

P S A L. CIV.

20 Thou makest darkness, the beasts of the forest do
and it is night, wherein all creep forth.

N O T E S.

Ver. 19. *Thence copious spreads, &c.*] It has been computed what number of particles of light a candle sends out every instant of time, to be visible through every point of a space two miles around it, or four miles in diameter ; and the number is many millions of millions of times greater than that of the grains of sand contained in the whole earth, which is a globe of twenty five thousand miles round. What then must be the number of particles or globules of light, that have been diffused through a space of many thousand millions of miles around that immense ocean of light the sun, during many thousands of years backward ?

Ver. 20. ——— *Life's vain tumults, &c.*] The cares and the joys of life are equally vain, being equally uncertain and short-lived. To what purpose is one transported at any temporal happiness, of the continuance of which he is utterly uncertain while he possesses it, and which he knows at best he can enjoy but a few years ? and why should any one be dejected at the arrival of any misfortune, since he knows not how soon he may get clear of it, and is sure his distress must be over in a few years at worst.

- 21 The furious lion roams in quest of prey,
To gorge his hunger till the dawn of day ;
His hideous roar with terror shakes the wood,
As from his Maker's hand he asks his food.
- 22 Again the sun his morning beams displays,
And fires the eastern mountains with his rays.
Before him fly the horrors of the night ;
He looks upon the world—and all is light.
Then the lone wand'ers of the dreary waste
Affrighted to their holds return in haste,
- 23 To man give up the world, his native reign,
Who then resumes his pow'r, and rules the plain.
- 24 How various are thy works, creator wise !
How to the fight beauties on beauties rise !
Where goodness worthy of a God bestows
His gifts on all, and without bounds o'erflows ;
Where wisdom bright appears, and pow'r divine,
And where infinitude itself doth shine ;

P S A L. CIV.

21. The young lions roar
after their prey, and seek their
meat from God.

22. The sun ariseth : they
gather themselves together,
and lay them down in their
dens.

23. Man goeth forth to his
work, and to his labour until
the evening.

24. O Lord, how manifold
are thy works ! in wisdom
hast thou made them all : the
earth is full of thy riches.

N O T E S.

Ver. 21. *His hideous roar, &c.*] The lion's manner of hunting his prey (according to naturalists) is this. Having no great sagacity of smell, he sets up a terrible roar in the night at his first coming out, then pursues them by the ear, till he catches them.

Ver. 24. *And where infinitude, &c.*] Though it should be affirmed, that all created things are in reality and strictness finite and bounded ; yet when compared to such imaginations as ours, or perhaps those of the highest archangel in heaven, they may be called infinite : for what conceptions are to be formed by a finite mind of the number of living creatures throughout the universe, of the num-

Where

TO THE CREATOR.

9

- Where excellence invisible's exprest,
And in his glorious works the God appears confest.
25 With life thy hand hath stock'd this earthly
plain,
Nor less the spacious empire of the main.
26 There the tall ships the rolling billows sweep,
And bound triumphant o'er th' unfathom'd deep.
There great leviathan in regal pride,
The scaly nations crouding by his side,
Far in the dark recesses of the main
O'er nature's wastes extends his boundless reign.
Round the dark bottoms of the mountains roves,
The hoary deep swells dreadful as he moves.
Now views the awful throne of antient night,
Then mounts exulting to the realms of light ;
Now launches to the deep, now stems the shore,
An ocean scarce contains the wild uproar.
27 Whate'er of life replenishes the flood,
Or walks the earth, or warbles thro' the wood,

P S A L. CIV.

25. So is this great and thou hast made to play there-
wide sea, wherein are things in :
creeping innumerable, both 27. These wait all upon
small and great beasts. thee : that thou mayst give
26. There go the ships ; them their meat in due sea-
there is that leviathan, whom son.

NOTES.

ber and minuteness of the particles which compose the parts of their bodies ; of the globules of the blood, to which a grain of sand is a mountain ; of those of light, probably still as much smaller than the globules of the blood ; of the immensity of the creation, and of the number of atoms or particles of matter which compose the stupendous whole ; all which are numbered before God ; but are probably beyond the comprehension of all created beings.

Ibid *Where excellence invisible, &c.*] "The invisible things (or attributes) of God are clearly seen, being understood by the things that are made, even his eternal power and Godhead."
Rom. i. 20.

C

In

- In nature's various wants to thee complains,
 28 The hand, which gave the life, the life sustains.
 To each th' appointed sustenance bestows,
 To each the noxious and the healthful shows.
 Thou spread'st thy bounty — meagre famine flies :
 29 Thou hid'st thy face — their vital vigor dies.
 30 Thy pow'rful word again restores their breath ;
 Renew'd creation triumphs over death.
 31 Th' Almighty o'er his works casts down his eye,
 And views their various excellence with joy :
 His works with rev'rence own his pow'rful hand,
 And humble nature waits his dread command.
 32 He looks upon the earth — her pillars shake,
 And from her centre her foundations quake.
 The hills he touches — clouds of smoke arise,
 And sulph'rous steams mount heavy to the skies.
 33 Whilst life informs this frame, that life shall be
 (O first and greatest !) sacred all to thee.
 Thy praise my morning song, my daily theme,
 My ev'ning subject, and my midnight dream ;

P S A L. CIV.

28. That thou givest them,
 they gather : thou openest
 thine hand, they are filled
 with good.

29. Thou hidest thy face,
 they are troubled : Thou
 takest away their breath :
 they die, and return to their
 dust.

30. Thou sendest forth thy
 spirit : they are created, and
 thou renewest the face of the
 earth.

31. The glory of the Lord
 shall endure for ever. The
 Lord shall rejoice in his
 works.

32. He looketh on the
 earth, and it trembleth : he
 toucheth the hills, and they
 smoke.

33. I will sing unto the
 Lord as long as I live : I will
 praise him whilst I have my
 being.

- 34 When grief oppresses, and when pain assails ;
 When all the man, and all the stoic fails ;
 When fierce tentation's stormy billows roll ;
 When guilt and horror overwhelm my soul ;
 With outward ills contending passions join'd,
 To shake frail virtue, and unhinge the mind ;
 When nature sinks ; when death's dark shades arise,
 And this world's glories vanish from these eyes ;
 Then may the thought of thee be ever near,
 To calm the tumult, and compose the fear.
 In all my woes thy favour my defence ;
 Safe in thy mercy, not my innocence.
 And thro' what future scenes thy hand may guide
 My wond'ring soul, and thro' what states untry'd,
 What distant seats foe'er I may explore,
 When frail mortality shall be no more ;

P S A L. CIV.

34. My meditation of him in the Lord.
 shall be sweet : I will be glad

NOTES.

Ver. 34.—*all the stoic, &c.*] Alluding to the antient sect of philosophy called stoicism, whose distinguishing doctrine was, that a man ought never to suffer himself to be in the least moved with any thing that happened to him. But the behaviour of the philosophers themselves shewed the insufficiency of their chimerical doctrine to support the mind in real distress.

Ibid. When guilt and horror, &c.] The thought in this and some of the following lines, goes upon a very different scheme from that of the heathen philosophers and poets, who talk like dreamers of the triumphant confidence with which virtue inspires the good man, sufficient to support him not only in danger and death ; but even in the midst of a ruining world : as if there were such a thing as a good or innocent man. Revelation gives us very different notions of our character and state before God. We are by it told, that we have all sinned and come short of our duty ; that there is none good but one, that is, God ; that the heavens are not pure in his sight, and that he charges his angels with folly. And, if the best of us examines strictly his own heart and life, he must own it to be an awful and startling prospect to look forward to that important change of state, which is to transmit him to the tribunal of an all-seeing judge.

If ought of meek or contrite in thy sight
 Shall fit me for the realms of bliss and light,
 Be this the bliss of all my future days,
 To view thy glories, and to sing thy praise.

- 35 When the dread hour, ordain'd of old, shall come,
 Which brings on stubborn guilt its righteous doom,
 When storms of fire on sinners shall be pour'd,
 And all th' obdurate in thy wrath devour'd;
 May I then hope to find a lowly place
 To stand the meanest of th' etherial race;
 Swift at thy word to wing the liquid sky,
 And on thy humblest messages to fly.
 Howe'er thy blissful sight may raise my soul,
 While vast eternity's long ages roll,

P S A L. CIV.

35. Let the sinners be consumed out of the earth, and let the wicked be no more. Bless thou the Lord, O my Soul. Hallelujah.

NOTES.

Ib. If ought of meek or contrite, &c.] If an offending order of beings are at all to be received into the favour of the supreme, it is plain, humility and penitence for their faults must be qualifications indispensably necessary, as the most merciful sovereign that ever can be, will hardly think it proper to receive his rebellious subjects into favour, so long as they continue rebellious.

Ver. 35: — stubborn guilt, &c.] The goodness of God is such, that he has declared it is only the obstinately wicked that are incapable of pardon.

Ib. Howe'er thy blissful Sight, &c.] As the conversation of characters illustrious for wisdom and virtue have a natural tendency to form those who have the happiness of enjoying it, to a likeness of such characters, so must the conversation of angels and just men made perfect, and above all the beatific vision of the divine glory in heaven, improve and exalt the powers and faculties of the blessed, and raise them to higher and higher degrees of perfection to all eternity. Thus 1 *John* iii. 2. "We shall be like him; for we shall see him as he is." So that the pious soul, which at present mourns under innumerable miseries and infirmities, will one day triumph amidst angels and archangels, and resemble them in glory; according to our Saviour's own words, *Luke* xx. 36. — "they shall be like to the angels." And if we allow an eternity for the
 Perfection

Perfection on perfection tow'ring high,
Glory on glory rais'd, and joy on joy,
Each pow'r improving in the bright'ning mind,
To humble virtues, lofty knowledge join'd ;
Be this my highest aim, howe'er I soar,
Before thy footstool prostrate to adore,
My brightest crown before thy feet to lay,
My pride to serve, my glory to obey.

NOTES.

blest spirits to improve in, and take into the consideration the advantages they may probably have for improvement, as new senses or inlets of knowledge, and other methods of receiving and communicating ideas, to us at present inconceivable, to what amazing lengths may not this carry them? let us only suppose the sagacity of a *Newton* joined to the memory of a *Clark*, and all opportunities of improvement given to the person we suppose blest with these two faculties in the highest degree, besides an endless, undisturbed and uninterrupted duration, for pursuing knowledge, and then form some idea of the exaltation such a genius must arrive at in such a length of time. But farther, let us consider the difference between the state of a person born deaf and blind, and of one who enjoys those senses in perfection, and from the immense advantages the one has above the other, endeavour to form some conception of the advantage one or two additional senses or methods of perception may give those glorified beings hereafter. But, if we were to suppose a human or angelic spirit to advance in improvements at ever so great a rate, and the improvements of such a spirit to advance with a rapidity accelerated in a tenfold or hundredfold proportion to all eternity, yet after millions and myriads of ages, the distance between the perfections of the most exalted creature, which will still be bounded and limited, and those of the divine nature, which are out of all bounds, will still be infinite; so that it will ever be the highest honour of the most glorious creature in the universe to worship, to serve, and obey the One supreme.

A N

I D E A of the C R E A T O R,

From His W O R K S.

BOTH reason and revelation agree in this grand and interesting truth, That the final happiness of all rational beings must consist in their having such notions of the supreme, as will effectually engage them to obey his will, and thereby gain his favour, upon which all depends. Accordingly we are told by our Saviour, *John* xvii. 3. "That it is life eternal to know the only true God." Without conceiving justly and worthily of the supreme governor of the world, we are not likely to honour him as God. And though a well-meant zeal may carry an honest but weak mind considerable lengths; yet it is plain, that neither our devotions nor our obedience can be so acceptable to God, if they proceed from any thing else than the consideration of his being truly worthy of them, and having a right to them.

There are but two ways, by which we have any manifestations of the object of worship, I mean, his works of creation, and the revelations he has been pleased to make of himself. And whoever endeavours to set either of these in a clear or engaging light, so as they may have their due influence upon men, may be said, at least, to aim at what is commendable. The wonders of creation have been celebrated by innumerable writers antient and modern. And the subject being inexhaustible, there needs not much apology for the following thoughts, any more than for the foregoing poem. Their briefness may suit some readers, and the mere novelty of the piece may chance to engage some others. And it is to be hoped none will be the worse for the perusal of them.

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The attributes, which appear the most conspicuous in the works of God, are his wisdom, goodness, and power. And these three perfections of the Divine Nature meet our view in every object we behold. To perceive the distinct marks and characters of the Divine wisdom, goodness, and power, we need only to lift up our eyes to the heavens, to bend our sight downward to the earth, or to look inward upon ourselves. The first living creature we meet, or even the first plant or flower we cast our eyes upon, shews the hand that formed it to have been set to work by inconceivable goodness, to have been guided by infinite wisdom, and endowed with Almighty power.

That a being necessarily possessed of infinite perfection, and consequently of an infinite degree of happiness from himself independently, should exert his power in producing innumerable multitudes of creatures, and worlds for their convenient habitation, with all accommodations proper for making them happy; could proceed from nothing but the immense and unbounded overflowings of his inconceivable goodness. For, as to the notion of his creating the universe and its inhabitants with a view to his own glory, or the praises of his creatures, alas! what is the praise of any number of finite, dependent, and imperfect beings (for such are all but the supreme only) before the infinite God, in whose sight the whole created universe with all its inhabitants, is but as a few atoms floating in the sun-beams. The extensiveness of the Divine goodness appears in that he hath condescended, from the exaltation of his infinite perfection, to provide a suitable measure or degree of happiness for every order of his creatures, from the highest archangel to the meanest reptile. To shew the truth of this observation fully, it would be necessary to take a particular view of the various states and conditions of every order of beings in the universe; and by what we see in this part of it which we inhabit, we have Reason to conclude, we should find throughout the whole (allowing for the miseries vice and irregularity have brought into the world, by which it must come to pass, that innocent creatures must often suffer by their connection with the guilty) we have reason, I say, to conclude, we should find throughout the universe a happiness allotted for every order of beings suitable to their respective rank and capacity; as a number of vessels of different sizes and capacities may all be full, tho' they may contain very different quantities. Even in the present disorderly state of things, though it is plain the earth groans under the load
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of the curse brought upon it by the guilt of its inhabitants, we see that the inferior creatures live, in the main, happy, and thoughtless either of past or future miseries, till a sudden and unforeseen stroke carries them off. And as for our species, we must own, that by far the greatest part of the unhappiness we suffer, is owing to our own bad conduct, or to the ill usage of others; and the remainder, to our being part of a guilty offending race of creatures, who have drawn down the divine displeasure upon our species, and the world we inhabit. And yet even in this life there are many comforts and enjoyments to be had, if we will resolve to follow the dictates of reason, and obey the precepts of our religion. But in future states, we are informed by revelation, that the heart of man cannot conceive the happiness prepared for the wise and virtuous.

O goodness infinite! goodness immense!

That all this good of evil hath produc'd. MILTON.

In treating upon the subject of the Divine wisdom which appears in the works of creation, I shall only bring a few instances of it, without pretending to enlarge on them. As, first, it may be observed, that the greatest effects in nature are produced by the most simple causes. Vegetation, for example, or the growth of all manner of plants, from the smallest pile of grass to the largest oak, with that of all kinds of fruits, herbs, roots, grains, and medicinal plants, is brought about by the same simple and uniform cause, viz. A principle or virtue of attraction, with which all bodily substances are endowed, whereby the small tubes or pipes, of an infinite number of which every vegetable is composed, draw in the fluid nourishment by degrees, which enlarges their size, and being matured and concocted by the heat of the sun, brings them to perfection. That there is such a principle or virtue in nature, appears by the experiment of small glass tubes or pipes, one end of which being immersed in any high coloured liquor, the fluid never fails visibly to ascend to a considerable height. The beating of the heart and circulation of the blood in man, and all other creatures, may, in the same manner, be in all reason ascribed to some one general and simple cause, whether that is the weight of the atmosphere, or whatever else. Sir *Isaac Newton* has made it plain, to the full conviction of all, but those who do not understand his demonstrations, that it is by one simple and uniform

uniform cause, that a stone or other heavy body falls to the ground, and that the moon, and all the planets and comet are kept in their orbits, and made to revolve round their centres, as in the sequel is more fully explained. It is also known, that the whole variety of the seasons is owing to the most simple and seemingly obvious contrivance imaginable, *viz.* The inclination of the earth's axis to the plane of the ecliptic, as is shewn afterwards. What a number of important effects are owing to a little warmth, and depend upon the earth's being situated precisely at such a distance from the sun, as is suitable to the state of its inhabitants? Every reader may pursue this thought in his own mind, and will find the truth of the observation universally throughout all Nature.

Another general remark, that may be made on the works of creation, setting forth the Divine Wisdom which appears in them, may be, That there is not one part or member of the immense whole, that does not serve to several different purposes at the same time, and answer each of its various ends as fully as if it had been intended only for that one. We may consider in this light every species of the brute creation, which, without doubt, were made to enjoy a certain portion of happiness, and also to serve either for our nourishment, for the culture of our lands, for our clothing, for food to other creatures, which were destined for our nourishment, or for our punishment, and as instruments of reproof and correction for our irregularities. In this manner likewise we may consider the air, which not only answers the end of respiration, but serves, at the same time, for the conveyance of the winged race, for navigation, for raising clouds and vapours, from whence dew and rain, so absolutely necessary for vegetation, for clearing the earth of noxious or pestilential vapours, by means of the winds; for refracting or bending the rays of the sun, by which means we enjoy his light both before he is risen, and after he is set, and to which we owe the grateful morning and evening twilights; for working several machines, as windmills, and such like; for being the vehicle of all manner of sound, and for producing the noblest effects by music in organs and by other instruments; for the vegetation of all manner of plants, to which experiments shew it to be absolutely necessary, and various other important purposes. In the same manner we may also consider every other elementary part of nature, and we shall find that the most minute object we

can cast our eyes or fix our thoughts upon, is made to answer more purposes than one.

If an ingenious mechanic makes a machine that shall measure time to a great degree of exactness, he is admired, and very justly, for the nicety of his work, and its fitness to answer the single end he intended it for. Nor is it expected, that an astronomical clock should at the same time answer the end of an air-pump, a windmill, and a fire-engine. On the contrary, every one knows, that the more complicated any machine of human invention is, the more different movements there are in a clock, for example, it will be the less exact and perfect. It is far otherwise in the Divine contrivances, where we see one cause bring about innumerable different effects, and all as regularly and properly, as if each several cause had been appointed for one single purpose.

Another general observation on the wisdom, which appears in the Divine Works, may be, that through the whole an astonishing variety joined with the most regular uniformity appears. Uniformity amidst variety is the very idea of beauty or perfection. Which two properties seem, as it were, to outvie one another throughout all nature, so far as our researches extend. If we consider either the animal or vegetable world, the inhabitants of the land, or of the waters, the minute or the great bodies in nature, in every respective species, the variety how extensive, yet the uniformity how close! The difference between the spreading oak, or towering cedar, and the humble shrub, how great! Yet the resemblance how near! No two trees, or plants of different species, but what differ essentially; nor even any two of the same species to be found exactly alike; Yet all formed on the same general plan; all proceeding from seeds; all vegetating in the same manner, and from the same principle. How many millions of these animalcula which microscopes shew in vinegar, in pepper-water, and in infusions of almost all kinds of vegetable substances, and indeed, throughout air, earth and water, would go to the weight of an elephant or whale? Yet an animalcule of a size small enough, for a grain of sand to smother ten thousand of them, as some are known to be, has a body, a head, with eyes, and a mouth, and probably a brain and heart, but without doubt veins and arteries, with a fluid circulating in them, with nerves, muscles, tendons, and most of the other parts of the largest animals. How different the elements of air and water, so that the inhabitants of the one cannot, gene-

generally speaking, subsist in the other! Yet these elements agree in most of their properties, being both fluids, and having both of them all the necessary properties of fluids. How different the manner of life of the inhabitants of the land and water! Yet how nearly allied to one another in the anatomy of their bodies, and in their senses. How endlessly various the properties and effects of different material substances. How seemingly different a lump of lead from a piece of cork; an ingot of gold of a foot in length, and half an inch in thickness, capable (as is found by experience) of being drawn to a wire long enough to reach from *London* to *York*, or one hundred and fifty miles; how different, I say, this ductile metal from the rock or sand of the mine in which it is found. How different that wonder of nature, the loadstone, from a common pebble. Quicksilver is capable, by one chemical operation or other, of being turned into almost any colour or consistence; in one state it is a noble medicine, in another a deadly poison; and after it has been forced by fire into an hundred different states, the original running mercury may be recovered. An author writing of the mineral called antimony, says, The life of man is too short to make all the experiments with it, and to see all the changes it is capable of, and the various effects that may be produced by and upon it. A little rain-water strained through the vessels of a vine forms the root, the wood, the bark, the pith, the leaves, the bloom, and the fruit; all different in their qualities, outward appearances and effects, yet all to be reckoned under the one general class of vegetable substances. The fruit alone, before it is ripe, yields verjuice, a liquor quite different from all other vinous ones; and when ripe, and dried in the sun, affords by distillation a fetid oil, and a hot spirit; if the grapes be dried and boiled, they make a sweet liquor, which being distilled, yields an oil and spirit much like those of raisins; the juice of the grapes squeezed out and fermented, becomes first a sweet and turbid liquor, called Must, which is quite different in nature and effects from wine: This liquor by degrees becomes less sweet and clearer, and is at last matured into wine; which, by distillation, affords an inflammable spirit. It will also in crystallization shoot into salts, and yield a great proportion of a liquor as sweet as honey. Besides the wine itself, the fermented juice of grapes affords dregs or lees, and tartar; which last may be analysed into five different substances, all less acid than the tartar itself. Wine likewise degenerates into vinegar, from which may

be obtained by fire a spirit, and a salt different from those of tartar. Thus does the same original matter, viz. a little puddle-water, shew itself in almost thirty different states in this one plant. But naturalists shew, that salts, acid, alkaline, volatile, and lixivate; spirits, vinous, urinous, and acid, oils of all kinds, sulphurs of all kinds, and even mercury, may be produced out of almost all kinds of substances. Amidst all this endless variety, it is certain, that all material substances agree in the general properties of extension, gravity, and impenetrability. Farther, if we consider in this light the whole solar system, no two planets are to be found, whose periods, magnitudes, velocities, distances, or planes are the same; yet all agree in being of nearly a round figure, and in being carried round their centres nearly in circles, with velocities in a certain exact proportion to their distances. The fixed stars are, in all probability, very different from one another in magnitude, in their revolutions round their own axes, and other circumstances; but they all agree in being luminous bodies; and if astronomers are right in supposing them all to be suns, with their respective systems of planets going round them (of which more afterwards) the inhabitants of those planets, however they may differ from one another, may yet be supposed with probability all to agree in one circumstance, that is, of being universally creatures endowed with the sense of sight; else to what purpose are they furnished with such a profusion of luminaries?

The very definition of wisdom is, the choosing the fittest means to accomplish the greatest ends. The grand end the Supreme Being had in view was the happiness of innumerable rational and sensitive creatures, than which a greater or more important one cannot be conceived. And that the Divine Wisdom has chosen in every instance the very best, or rather only means fit for answering each respective end, and even a variety of ends by one and the same means, is not only demonstrable *à priori* from the infinitive wisdom of God, but is likewise found by experience and observation, as far as our enquiries go; and the more deeply we search into his admirable works, the more of deep contrivance and design we find, and the more of the fitness of every several cause to produce its effects.

The greatness of that power, which has been exerted in the creation, though every object in nature shews it, will best appear by considering a little the GREAT Works, properly so called, of nature; the sun, and planets, and the
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fixed stars. The sun and moon, the most conspicuous to us of all the celestial bodies, are the only ones mentioned in the sacred text *: But the invention of that noblest of instruments the telescope, and the sagacity of the astronomers of later ages, whose observations have improved and corrected those of the foregoing, afford us a very different idea of the solar system, from what the single consideration of those two most conspicuous bodies gives us. As this piece may probably fall into the hands of some, who have not leisure or opportunities of reading books of astronomy, the following brief view of our system, and of the immensity of the creation, according to the theory of the moderns, may not be unacceptable.

It is proper, in the first place, just to mention, That the real magnitudes, distances, orbits, and other affections of the bodies of our system are determined by what astronomers call their parallaxes, and by their elongations from the sun, and their apparent magnitudes, and other analogical methods, which would take up by far too much time to explain here; by which it is possible to determine their magnitudes and distances, when those distances are not too great to yield a parallax. Astronomers, for example, know certainly the distance of the moon from the earth, viz. 240 thousand miles, because the moon yields a very sensible parallax; and they know, that the sun's distance from the earth is very probably, at least, ten thousand times the diameter or thickness of the earth, which is about eight thousand miles, and brings the whole distance to about eighty millions of miles. It is, I say, hardly to be doubted, that the distance from the sun to the earth is, at least, eighty millions of miles; but it is not certainly known, whether it is not a great deal more. In the year 1761, the distance of all the planets from the sun will be determined to a great degree of exactness by observations on a transit of the planet *Venus* over the face of the sun, which is to happen the 6th of *May*, in that year. But, according to the present theory, the sun, to appear of the magnitude he does to our eyes at the distance of eighty millions of miles, must be a body a great many hundred thousand times larger than the earth, so that if his centre were placed where that of the earth is, his outward surface would extend one hundred and forty thousand miles higher than the orbit of the moon, his diameter or thickness being seven hundred and sixty thousand miles, whereas that of the earth is but about eight thousand.

* Verse 19th of the Psalm.

and. This amazing world of fire turns once round in about twenty-five days. This is known by a number of dusky spots which appear upon the sun's face, so as to be seen sometimes with the naked eye, when he shines through a thin cloud or mist; but are always observable with the help of a telescope, with a dark glass for the security of the eye. These spots could not be visible at the distance of the sun, if they were not as large as the whole earth; but such of them as appear of a considerable breadth, as they often do, must be still vastly larger. They never continue long to make the same appearance; but are always rising and vanishing again. They are most probably exhalations floating in the sun's atmosphere at some distance from his body.

This glorious luminary, the centre of our system, has six opaque globes, commonly called the planets, going round him at different distances, and in different periods, but all from west to east, as follows.

1. *Mercury*, a body considerably inferior in size to the earth, performs his course in about three months, which is his year, at the distance of thirty millions of miles from the sun. The heat of the sun in *Mercury* (if there be no provision made for mitigating it) must be such, as if it were the same on the earth, would keep all the waters upon it constantly boiling: And the brightness of the sun's light must be such as would be quite intolerable to eyes like ours. But it does not follow, that *Mercury* is therefore uninhabitable; since it can be no difficulty for the Divine Power and Wisdom to accommodate the inhabitants to the place they are to inhabit; as the cold we see frogs and fishes bear very well, would soon deprive any of our species of life. To an eye such as ours, the sun, seen from this planet, would appear seven times as large as he does to us. He is always so near the sun, that we have no opportunity of discovering whether he turns round upon his own axis, or not, and consequently cannot determine what length the days and nights in *Mercury* are. He is seen sometimes with telescopes horned like the moon, and sometimes like a half-moon, but never fully illuminated, because that side of the planet, on which the sun shines, is never turned full towards us, except when he is so near the sun, as to be lost in the brightness of his beams. His enlightened side is always towards the sun, which shews, that he only shines with the borrowed light of the sun. That this planet revolves round the sun in an orbit nearer to him, than that of the earth, is plain, because he is never seen opposite to the sun, but always in the west, when he is seen at sun-setting, and in the east, when he is seen at sun-rising; and

and that never beyond the distance of twenty-eight degrees from the sun (a degree is about twice the apparent breadth of the moon.) The same considerations prove, that the next planet, *viz.*

2. *Venus* revolves round the sun in an orbit including that of *Mercury* within it. For she is always seen in the neighbourhood of the sun, and never appears in the west when the sun is in the east, nor contrariwise; nor ever removes above forty-eight degrees from him. When she is on one side of her orbit, she is our morning, and on the other our evening-star. This planet turns round upon its own axis in twenty-three hours*, as the earth does in twenty-four. *Venus* performs her annual revolution round the sun in two hundred twenty-four days, at the distance of about fifty-nine millions of miles from the sun. She is nearly of the size of the earth. She appears through a telescope exactly as the moon does to the naked eye, partly enlightened, and partly dark, and with the same inequalities on her face as on that of the moon. Some astronomers fancy they have seen a satellite or moon near *Venus*, like that belonging to the earth: But it is not yet certain whether they have deceived themselves or not.

3. The earth, which we inhabit, possesses the next place in the solar system, and, at the distance of about eighty millions of miles, as above, performs her yearly revolution round the sun in about three hundred sixty-five days, and at the same time, as a bowl upon a bowling-green not only proceeds forward, but likewise turns round upon its own axis, so does the earth turn once round upon its axis as it goes along, every twenty-four hours. It is astonishing, and even frightful to think, that this vast and cumbrous globe of earth and sea, which is about twenty-five thousand miles in circumference, has received such an impulse from the Almighty Arm, as has carried it constantly for above these five thousand years, that we know of, round the sun at the rate of at least fifty thousand miles every hour, which it must absolutely do, to go round the sun in a year at the distance of eighty millions of miles from him. So that, if an angel were to come from some other world, and to place himself near the earth's way, he would see it pass by him with a swiftness to which that of a cannon ball is but as one to one hundred, and would be left behind by it no less than the above number of miles in the space of one hour. There is no more reason to doubt, that the earth goes in this manner round the sun, than there would be for a passenger in a ship on smooth water,

* In as many days, according to some.

water, who saw the objects upon land continually passing by, to doubt whether the vessel he was in, or the shore, was in motion. We see the sun continually change his place with respect to the fixed stars, and must own it to be highly improbable that this change of place is owing to any change in the whole heavens, which, considering the distance of the starry heavens, would require a motion infinitely more rapid than that above ascribed to the earth. As for the common objection against the earth's motion, that we are not sensible of it, and that a stone thrown up from the earth ought not to fall down upon the same place again; it is answered at once by the above comparison of a ship, from which (as has been often found by experiment) a ball fired directly up in the air, does not fall behind the ship, let her motion be ever so swift, but, partaking of the ship's motion, is carried forward in the air, and falls down again upon the deck. And as to the objections taken from some scripture expressions, which seem to contradict the theory of the earth's motion, it is plain, from innumerable instances, that revelation was not given to mankind to make them philosophers or deep reasoners, but to improve them in virtue and piety; and that it was therefore proper it should be expressed in a manner accommodated to common capacities and popular opinions in all points merely speculative, and which were not to have any direct influence upon the hearts and lives of men. The truth of the matter is, that the demonstrations given by the incomparable Sir *Isaac Newton*, have established the doctrine of the motion of the earth and other planets and the comets round the sun, and of the secondary planets or satellites round their primaries, in such a manner, as leaves no room for any, but such as do not understand them, to hesitate about it. The sun's apparent rising and setting is therefore owing to the earth's turning round upon its own axis; and his apparent change of place among the fixed stars, to our real change of situation round the sun. The different seasons of the year, with all their delightful varieties, are owing to the most simple contrivance that can be imagined, *viz.* the inclination of the earth's axis to the plane of the ecliptic. Any person who has not an opportunity of seeing an Orrery, may easily represent this by an apple or any other round body with a wire thrust through the middle of it, and carried round a table, having a candle placed on the middle; if the lower end of the wire be made to touch the table all the way round, and to lean a little, the upper end

still pointing towards the same side of the room, by turning the skewer round, as it is carried along, it will be easy to understand how the earth's turning once round upon her own axis, makes a day and a night; and by carrying the apple round the table, it will be easy to shew how the Sun (represented by the candle) must seem to change place with regard to the fixed stars; and by observing how differently the light of the candle enlightens the different parts of the apple, as the wire points toward it, or from it, the cause of the difference of the seasons, of the length of the days and nights, of the sun's shining more directly or more obliquely upon different parts of the earth, and of the heat of summer and cold of winter, may be made plain to any capacity. That the earth is of a round, or nearly round figure, is plain from the shadow it casts upon the face of the moon in a partial eclipse of the moon, which is always round, and never of any other figure. It is also manifest from what is always observed at sea, viz. That a ship, as it approaches, first shews its masts and sails, and by degrees its lower parts, till it becomes all visible; and, as it goes off, its hulk is first lost, and then its sails and upper parts, till it be quite hid by the convexity or roundness of the surface of the ocean.

As the earth is carried round the sun once in a year, so is the moon carried round the earth once in about twenty seven days, accompanying her in her whole revolution, at the abovementioned distance of two hundred and forty thousand miles, and keeping always the same face towards the earth. That the moon goes round the earth, as her centre, is evident to the eye. For, when she is between the sun and the earth, she is invisible to us, her dark side being turned toward us. When she goes a little way forward in her revolution, so as to come from between us and the sun, we see a small part of her body enlightened, and so on still more and more, till she comes to be in opposition to the sun, and then we see all that side of her which the sun shines upon, when we say she is full; though the sun does not, in reality, enlighten any more of her body at full than at new moon; only her enlightened side is turned towards us in the one case, and from us in the other. This whole matter may be made very plain to any capacity in the same manner as is above directed with regard to the earth's revolution round the sun, by carrying a smaller apple or ball, to represent the moon, round the first, which represents the earth, and observing how the light of the candle shining upon

the little ball must appear to a fly or other insect placed upon the large one. Whenever the moon happens to come exactly between the earth and the sun, she stops the light of the sun, and then we say, the sun is eclipsed; and according as the moon happens to cover a part or the whole of the sun's face, we call the eclipse partial or total. Sometimes a total eclipse of the sun happens when the moon is at her greatest distance from the earth (for she does not go round the earth in an exact circle, as neither do any of the rest of the primary or secondary planets round their centres) and then, as all objects appear smaller according to their distance, she does not cover the whole face of the sun, but a part of his body is seen round the moon like a shining ring. But, if the moon happens to come between the earth and sun, when she is at her least distance from the earth, she appears then so large as to cover the whole face of the sun, and makes, for some minutes, a darkness equal to that of twilight. When the earth comes exactly between the sun and the moon, she darkens a part, or the whole, of the moon's face, and makes an eclipse of the moon. The earth being a body about thirty or forty times larger than the moon, casts a shadow large enough to eclipse the moon, if her diameter were three times greater than it is, whereas the shadow of the moon can never eclipse the whole face of the earth together. If the moon revolved round the earth in the same plane as the earth goes round the sun, there would be constantly an eclipse of the sun every new, and of the moon every full moon. But to prevent this inconvenience, the author of nature has ordered matters so, that the course of the moon round the earth is sometimes above and sometimes below that of the earth round the sun, so that their shadows generally miss one another. These motions are so exactly regulated, that astronomers can foretel eclipses to minutes at an hundred years distance, than which there is not a more remarkable instance either of human sagacity, or of the truth of that expression of scripture, "That the works of God are all made in number, weight, and measure." It is certain, by observations made with good telescopes, that, though the face of the moon is covered with innumerable inequalities like the mountains upon the earth, there is no great collection of waters upon it, like our oceans; nor is there any reason, from her appearance through those instruments, to suppose she has any such appendage belonging to her as our atmosphere of air. If the moon is inhabited (as she may for any thing we know)

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those who live on one side or hemisphere never can see our world, and those who live on the other can never lose sight of it, except when the earth comes between them and the sun, as she keeps always one side turned towards us. Those who live about the middle parts of the hemisphere that looks toward the earth, must see it always directly over their heads with much the same appearances as the moon makes to us, sometimes horned, sometimes half, and sometimes wholly illuminated, but of a vastly greater bulk than the moon appears to us. It seems highly probable, that the attraction of the moon acting more effectually upon the fluid than the solid parts of our terraqueous globe is the cause of our tides, as they answer so exactly to her motions, and distances from us, and other circumstances. To enter upon that theory, however, would be beside my present purpose.

4. Mars is the fourth primary planet in the solar system; for the moon is properly to be termed a satellit, or secondary planet, as respecting the earth, and not the sun, for her centre. He revolves round the sun in the space of near two years, at the distance of about one hundred and twenty millions of miles. His bulk is reckoned to be much inferior to that of the earth. It is by the parallax of this planet, that the best estimate has yet been made of the true distance of the sun from the earth and other planets. He turns round his own axis in very nearly the same time as the earth, as is evident by the spots seen on his face with telescopes. It has not yet been discovered, whether this planet has any satellit or moon belonging to him or not. That his orbit is without that of the earth, and consequently that he revolves round the sun at a greater distance than the earth, is evident from his being often seen in the side of the heavens opposite to the sun. He is sometimes seen through telescopes as the moon appears in her third quarter, part of his dark side being then turned toward us, which shews that his light is borrowed from the sun. This planet appears always with a troubled ruddy light, from whence, and from the appearance of the fixed stars near his body, astronomers conjecture that he is surrounded with a very gross atmosphere, and that the appearance of belts or fasciæ upon his face are ranges of clouds, which probably keep always nearly the same place round his body, as his axis is nearly perpendicular to the plane of his orbit. If there are any inhabitants in Mars, they can never see Mercury, but when he passes over the face of the sun. They will see Venus sometimes extremely near the sun, as we sometimes see Mercury. The

earth and moon will appear to them, through telescopes, if they have any such instruments, like two moons, a larger and a smaller, sometimes horned, sometimes half or three quarters illuminated, but never full, and always changing place with regard to one another. And the above mentioned two hundred and forty thousand miles, the distance between the earth and moon, will to their naked eyes (if their sight be like ours) be shrunk into a space no greater than 15 minutes of a degree, or half the breadth of the moon, as she appears to our naked eyes. The earth and moon must appear in Mars sometimes much larger than at others, as Mars does to us, the distance between us being in one part of our revolution five or six times less than in the opposite.

5. Jupiter revolves round the sun in the space of about twelve years, and round his own axis in a little less than ten hours; so that his year is as long as twelve of ours, and his day and night not quite ten hours long. That his orbit is without the earth's, is plain from his being seen in opposition to the sun, and always with a full illuminated face. His diurnal revolution is very visible through a telescope by means of a remarkable spot upon his face. His distance from the sun is supposed to be about four hundred, and consequently from us above three hundred millions of miles. To appear to us so conspicuous as he does at such a distance, he must be many hundred times bigger than the earth. Jupiter has no less than four moons revolving round him in the following periods, viz. The nearest in almost two days, at the distance of near three times the diameter or thickness of Jupiter's body, which, according to the calculations of astronomers, comes to nearly the distance of the moon from the earth. To the inhabitants of this first moon, if there are any, Jupiter must appear as our earth to the inhabitants of our moon, if such there be; only he will appear to them large enough to cover twenty degrees, or a ninth part of their whole heavens. The second satellit revolves round Jupiter in about three days and an half, at the distance of about three hundred and sixty thousand miles. The third, in about a week, at the distance of about five hundred and eighty thousand miles. The fourth and outermost, performs its revolution in a little above sixteen days and an half, at the distance of about two millions of miles.

It is probable, that the shades or belts seen upon Jupiter's face are, as well as those of Mars, no other than ranges of clouds or vapours hanging in his atmosphere. It is by the

the eclipses of Jupiter's moons that astronomers have made one of their noblest discoveries, viz. That light is propagated in a certain time from the sun, and reaches the planets sooner or later, according to their respective distances. It is certain, that the revolutions of all Jupiter's satellites are, in reality, so equable, that any careful observer may exactly foretel the minute when any one of them is to be hid behind the body of Jupiter, or to pass between us and his body. But when the earth is in that part of her orbit which is farthest from Jupiter, it is always found, that those eclipses happen considerably later than the true time of occultation, which can only be occasioned by the light's taking so many minutes more in its passage from Jupiter to the earth at her farthest than at her nearest distance. From hence astronomers have found that light is about seven minutes in its passage from the sun to the earth, being after the rate of above ten millions of miles in one minute, or about fifty or sixty thousand miles in the space in which one can pronounce the word light. A cannon ball, continuing its motion at the same rate as that with which it flies the first second of time after its eruption from the mouth of the cannon, would spend about twenty five years in coming from the sun to us; and a body, that moved with the swiftness of a horse or a ship, would take up many ages in passing through such a space. It is by the difference of the time of seeing the eclipses of Jupiter's moons in different parts of the world, that the longitude of places, or their distances to the east or west of the meridian of London or any other place, is best determined.

6. The sixth and outermost of the primary planets is Saturn; he revolves round the sun in the space of almost thirty years, at the distance of about eight hundred millions of miles. His great distance from us has hitherto prevented astronomers from observing his revolution on his own axis. To make the appearance he does to us, at the distance of above seven hundred millions of miles, he must be several hundreds of times larger than the earth, though his magnitude is supposed to be much inferior to that of Jupiter. There is belonging to this planet the most extraordinary and unaccountable phenomenon in nature, viz. A huge bright circle, or ring, surrounding his body, supposed, by the appearance it makes to us, to be no less than twenty thousand miles broad, and about as many from the body of the planet. Whether this amazing appearance has been occasioned

sioned by any disruption of the body of the planet, as our earth has been by some supposed to have been reduced to her present shattered condition by the deluge; or whether this ring has been designed by the author of nature as an original appendage of the planet, to encrease their light, which, according to our notions, must be very necessary at the distance of Saturn; which of these, I say, or whether either of them is the case, is not yet known. To the inhabitants of Saturn, if there are any, this ring must appear to be in the heavens, and not to belong to the planet itself. Saturn has no less than five moons, very distinctly visible through a good telescope, revolving round him. The first revolves in almost two days, at the distance of above one hundred and twenty thousand miles from Saturn's centre. The third in almost three days, at the distance of about three hundred thousand miles. The second performs his revolution in four days and a half, at much the same distance from Saturn's centre as the distance between the earth and moon. The fourth revolves in sixteen days, and is distant from Saturn about five hundred and forty thousand miles. The fifth and outermost, takes up seventy nine days and an half in his revolution, and is supposed to be above one million and an half of miles distant from Saturn. To suppose that the author of nature had any view to us, when he created these secondary planets or moons, and gave them their revolutions round Jupiter and Saturn; to imagine that he intended those vast bodies (for some of those moons cannot be supposed to be less than the earth we inhabit) for any benefit or advantage to us, which he knew should never be seen by any but a few astronomers peeping through telescopes; to imagine, I say, that the divine wisdom should contrive things so ill, is as much to his honour, as if we should suppose he had placed a sun and planetary system within the globe of the earth, and intended it for our use. But, to return, if there are inhabitants in Saturn, which I know no reason we have to doubt, their five moons must not only be of vast use in increasing their light, which at that distance can never, at mid day, be so bright as our twilight, but must likewise afford them great entertainment in observing them as they rise, sometimes all together, sometimes separately, and as they eclipse one another in their revolutions. The sun must appear to the inhabitants of Saturn, if their eyes are like ours, one hundred times less than it does to us, or about twice as big as the planet Venus does to our naked eyes, when she is at the brightest. Therefore the warmest region in this planet must, if there

there be no provision for qualifying it, be colder than it is in Greenland. So that if the earth were removed to the distance of Saturn, all the fluids upon it must be turned into ice, as under the poles, without a possibility of ever returning to their fluid state, but by the force of fire. Neither Mercury, Venus, the earth, the moon, nor Mars can be seen at the distance of Saturn by such eyes as ours, unassisted by instruments.

It may be just proper to mention, before I conclude this brief account of the planetary system, that the direct, stationary, and retrograde motions of the superior planets, viz. Mars, Jupiter and Saturn, that is, their appearing to us sometimes to go forward, from west to east, sometimes to stand still, and sometimes to go backward from east to west, is the consequence, and the proof of their and our revolving round the sun all in one direction, viz. from west to east, but in different periods and at different distances, as may be made plain to the meanest capacity by an orrery.

The appearances abovementioned as visible only by the help of a telescope, with those which follow, respecting the fixed stars, may be seen by any one who uses good instruments of that kind. Those I have used are made by Mr. Short, in Surry-street in the Strand; who has made one the longest of the reflecting kind, that was ever brought to perfection, being twelve feet in focal length, which magnifies an object twelve hundred times, so that it shews the moon, whose distance from us, as has been said, is two hundred and forty thousand miles, as it would appear to the naked eye, at the distance of two hundred.

Besides the six primary planets, which revolve round the sun in the periods, and at the distances above mentioned, and the ten secondaries or moons, one of which revolves round the earth, four round Jupiter, and five round Saturn, as above described; besides these, I say, modern astronomy shews, that there are a great many other stupendous bodies, called comets, to be considered as part of the solar system; for that those bodies actually revolve round the sun, though in orbits so very elliptical or oval, that they are never visible to us, but when they are in that part of their revolution which is nearest the sun. That the comets are great bodies like the planets, and that their distance is beyond that of the moon, and that they are not meteors generated in the air, is demonstrable by their parallaxes. And that they, or some of them at least, regard the sun as their centre, though their distance from him in different parts of their

their courses is very different, is plain from observations made on that part of their orbit which is within our view, from whence astronomers calculate the whole. The courses of the comets are very different from those of the planets; for, whereas all the planets, both primary and secondary, revolve round their centres from west to east, and all nearly in the same plane, on the contrary, the comets come from all points of the compass, and from all parts of the heavens, toward the sun, and after turning round his body, as a racer turns the goal, go off again in the same manner toward all parts of the heavens, and run out into the infinite expanse, some of them a great way beyond the orbit of Saturn. But there is one general regulation, which the creator of the universe has established for all the revolving bodies of our system, viz. That according as they are nearer or farther from their centres, their motion is quicker or slower, and that in an exact proportion. Accordingly the comets, though the most seemingly irregular of any of the bodies in our system, observe this rule strictly; so that, as a comet draws nearer to the sun, it is always observed to accelerate its motion, and to slacken its pace, as it goes off from him. The incomparable Sir Isaac Newton has shewn, that it is by one and the same principle, that a stone let drop from the top of a tower falls toward the earth with a motion continually accelerated, that the moon is kept always in the neighbourhood of the earth, instead of being carried off into infinite space by the impulse, commonly called the projectile force, which causes her revolution; that the planets are kept in their orbits round the sun; and that the comets are attracted toward the sun, keeping in a path or course not direct toward his centre, but angular, as a racer going toward the goal he is to turn round, and still swifter and swifter, according as they approach more and more near to him (which enables them to go round him, without shocking against his body) and that they go off slower and slower, as they move farther and farther from him, till at last, the force, which carries them round, becomes almost insensible, and then the sun, whose attraction reaches to an immense distance every way round him, begins again by slow degrees to draw them back towards him in their respective paths or orbits, and so their revolution is continued. Sir Isaac has given the name of attraction to this virtue or force which keeps all the revolving bodies of our system in their orbits, though he does not pretend to account for its cause, otherwise than by ascribing it to the first cause of all, viz. The supreme being acting in and upon the machine

machine of the world, by the means or interposition, perhaps, of some immensely subtle and elastic element. As for the force, which carries the planets and comets round their centres, and which would carry them out into infinite space, if the attraction from the centre did not prevent it, it is only to be accounted for in the same manner, by ascribing it to the divine power. It is by the ballancing and proportioning of these two forces, called the centripetal and centrifugal, that the whole machine of the world performs its motions. This may be made very plain by fixing to the middle of a large table the end of a small cord, to the other end of which is fastned a clew or ball. Throw the ball from you, toward the centre, but not directly, and you will see it revolve round the central pin or nail, which fastens the end of the cord to the table. Here the cord (which keeps the ball from flying off) represents the centripetal force of virtue, which keeps the planets in their orbits, and the force you give the ball, when you throw it from you, represents the centrifugal force, or impulse given the planet by the almighty hand (for the earth or any other planet is but a very diminutive ball in the hand of God) which carries it on in its revolution. And if you could make the cord lengthen and shorten regularly, and the ball go round constantly the swifter according as the cord shortned, and contrariwise, you would have an exact representation of the course of a comet. That there is such a thing as attraction, or a tendency in all material substances to approach nearer and nearer to one another, which attraction is stronger or weaker in a certain exact proportion to the distance, may be made evident to the sight, by placing afloat in the middle of a broad vessel of water a number of small pieces of cork, wood, or any other substance, which, though they be put at some small distance from one another, will always come together in a little time, and if one be larger than the others it will shew that its attractive virtue is proportionably stronger, by bringing all the small ones to itself, and by drawing them along with it, if you move it. If there are any inhabitants in the comets, they must live a life wholly inconceivable to us. The comet of 1680, for example, when it was nearest the sun, on December the 8th, was exposed to a heat almost thirty thousand times greater than the greatest we have at the tropics. No earthly substance could have bore such a heat without not only being melted, but even being dissipated or turned into glass. The sun, seen from the body of the comet, if we can suppose there was there any eye to see it,

must

must appear one hundred and twenty degrees in diameter, so that it would seem large enough to cover almost the whole heavens, than which a more tremendous light cannot be conceived; and at its farthest distance the sun must be so diminished as to appear but a little brighter and larger than the star called Sirius, or the Dog-star, does to us. For astronomers suppose that comet, at its farthest distance from the sun, to go off three or four times the distance of Saturn, and that its period or time of going its course is five hundred and seventy five years. That of another, they suppose to be one hundred and twenty five years; and of another, which according to them, may be expected to appear in 1758, to be seventy five years. Besides these, astronomers think they have reason to reckon eighteen others belonging to our system: but they do not pretend to put the theory of comets upon the same footing as that of the planets. The comets differ very much in appearance one from another, and all from the planets, in that they all look dusky and gloomy, as if surrounded with a very gross atmosphere, and project behind them, that is, toward the part of the heavens that is opposite to the sun, a stream of mist or vapour, commonly called their tails. It is most likely, that the tail of a comet is only its atmosphere rarified to a great degree by the extreme heat of the sun, on its approach to him: for it is always observed, that the tail becomes longer as the comet approaches nearer to the sun, and contrariwise. The tail of the comet, which appeared in 1680, extended itself over no less than sixty degrees, or a third part of our whole heavens from east to west. To make such an appearance at the distance that comet was supposed to be at, the tail must have been many millions of miles in length. Whether these tremendous bodies, which the Almighty has set a traversing in this fearful manner through the vast expanse, be worlds formerly inhabited, and now reduced to a chaos, with their wicked inhabitants left in them in a state of punishment; or whether they are future worlds, not yet reduced to an habitable state; or whether they are vast masses of combustible matter made to pass periodically round the sun, and after a number of revolutions, approaching every time nearer and nearer, as it is supposed some of them do, are at last to drop into the sun, as an addition of fuel to make up for his immense and continual waste of light and heat; or whether they are intended to impregnate from time to time the regions of the planets with a quantity of salutary particles to make up for the decay or waste of those necessary

ary principles; or whether they are formed to bring about deluges or conflagrations, and so prove the instruments of the divine vengeance upon his offending creatures; whether any of these, I say, be the design for which infinite Wisdom formed these amazing bodies, and let them loose to wander through the sky, is above human understanding to determine. It is plain, that the shock of a body, of the size of a comet, against the earth or any of the planets moving with the rapidity they have in their approach to, or recess from the Sun, especially if the motion of both the comet and planet should happen to be contrary, must be attended with consequences frightful beyond all imagination. But it is highly probable, that even the near approach of a comet to the earth would cause terrible effects. Our comfort is, that the whole machine of nature is in the hands of one who knows how to conduct and manage all its vast and unwieldy parts, and that the motions of those dreadful bodies, though to such puny creatures as we are, they seem the more terrible the more we consider them, are entirely under his rule and guidance, and that no one part of nature can break loose upon, or bear down another, without his permission.

Some comets have, by the calculations of the best astronomers, been supposed, at their greatest distance from the sun, to recede no less than four times as far from him as the distance between the sun and Saturn. Yet it is highly probable that comets, even at that amazing distance, do not approach so near any of the fixed stars as to be affected by their attraction, but return periodically and revolve round the sun. Here is therefore, according to probability, a space, of which the sun is the centre, and in which the planets and comets move round him, consisting of a number of miles not under six or seven thousand millions, and no one knows how much more, yet quite clear of the attraction of all the fixed stars around, which in all probability reaches as far as that of the sun, or about three or four thousand millions of miles every way round each star. Whence we may suppose, no two fixed stars in the heavens to be nearer to one another than six thousand millions of miles, however crowded they seem at this distance. But by the more accurate and improved observations of the moderns it is found, contrary to the suppositions of former astronomers, that the fixed stars yield no sensible parallax, and that, though we are no less than a whole breadth of the earth's annual orbit, or 160

millions of miles nearer some of them at one time of the year, than at the opposite, their appearance, magnitudes and distances from one another are always the same. This shews that the above 160 millions of miles bears no more proportion to the distance of the fixed stars, than one pace does to ten miles. Upon this theory they may be safely placed at no less than ten thousand times the breadth of the earth's annual orbit from us. Their distance then in figures will be 1,600,000,000,000, which makes one billion, or one thousand times one thousand millions, and six hundred thousand millions of miles. Farther, if we consider the immense distance of the fixed stars, and consequently, the magnitude they must be of, to be visible by us at this distance, we can hardly suppose the divine wisdom, which does nothing in vain, has created such numbers of luminous bodies, of magnitudes inconceivable, and at distances almost infinite, for no other purpose but to afford us a little glimmering light in the night, which could have been done more effectually, and with infinitely less exertion of creating power, by one single additional moon. For what purpose then shall we suppose such a profusion of stupendous luminaries created? In all probability, or rather without all doubt, to enlighten innumerable systems of worlds, which revolve round them, in the same manner as our earth and the other planets of our system revolve round the sun. If therefore every one of the fixed stars is a sun, with its system of planets revolving round it, it is highly probable, each of those systems takes up a space nearly equal to what has been above shewn ours does: for why should we suppose a greater extent of space given to our system than to any other, that is, a greater than is necessary? Now, as to the number of these glorious luminaries, the latest catalogues of the fixed stars amount to about three thousand on all sides of the heavens, most of which are visible to the naked eye. But, if we have recourse to telescopes, the number of the stars becomes next to infinite: for according as we use more and more perfect instruments, we discover greater and greater numbers in almost every constellation. In that of the Pleiades or seven Stars, good telescopes discover three or four score; in Orion, where the naked eye does not discover above forty or fifty, those instruments shew two thousand; in the constellation Perseus alone, there are more stars to be seen with telescopes, than with the naked eye in the whole heavens; and in the Galaxy, or milky Way, which encircles the whole

concave

concave of the heavens, of the breadth of several degrees, it is probable the number of stars is immense, whose blended light causes that remarkable brightness in that part of the heavens, though their distance is so great, that the single stars, of which it is composed, cannot be distinguished. If, as is probable, the stars of the first magnitude (as they are commonly called) appear so large and bright only because they are nearest to us, and those of the second only appear dimmer because they are as much farther beyond those of the first magnitude, as from hence to those nearest, and if those of the third and fourth, and so on to the sixth degree of apparent magnitude be still in the same manner distant from each other by intervals equal to the distance from hence to the nearest; and if the case of the telescopic stars be the same, and if each of those innumerable millions and myriads of luminaries be in fact, as is highly probable, a glorious sun, a stupendous world of light and heat, with its system of planets, moons and comets going round it, and if all those planets and moons be worlds inhabited by various orders of beings, enjoying or preparing themselves for such degrees of happiness as the divine wisdom and goodness has appointed for them; if this, I say, be a just idea of the universe (and surely no idea we can frame is too grand for omnipotence to produce) we have here a view of that expanse to which the epithet VAST, is not improperly given in the foregoing poem, and must own, that the universe, considered in this Manner, is a theatre truly fit for a God to display his infinite power, wisdom and goodness. But after we have, by computation, extended the created universe to a space containing the greatest number of miles human arithmetic can express, what is that space to Infinity? It is even a point, that bears no proportion to the unbounded and unlimited presence of the Divine Nature. Were an angelic being to take his flight from this part of the universe, and to proceed in a direct course with the swiftness of light, it is certain, that, should he continue his flight to all eternity, he must still find himself in the centre of the divine presence. So strictly just, as well as inimitably sublime, are those expressions of scripture, "In him we live, and move, and have our being. There is no flying from his presence. The heavens, even the heaven of heavens cannot contain him," &c.

I cannot

I cannot help adding here, by way of contrast to the view we have been taking of the divine power in his great works, a word or two upon the display he has given of it in his minute ones, which are not less astonishing, nor less worthy of him.

That admirable instrument the microscope * has opened to us of these latter ages a world utterly unknown to the

* There are very few substances, in which the microscope does not show something curious and unexpected; but for the sake of such readers as are unacquainted with that instrument, I shall set down some of the most remarkably entertaining objects, upon which actual observations have been made.

1. The globules of the blood, which are computed to be almost a two thousandth part of an inch in diameter, each consisting of six small globules, each of which again probably consists of six smaller, and so on. The circulation of the blood is to be seen very distinctly in the tail of a fish, the web of the foot of a frog, &c. and the globules to split and divide, before they can enter the smallest vessel.

2. The bones of all creatures, sliced extremely thin, afford an entertaining object for the microscope, consisting of innumerable perforations, and ramifications, disposed in an endless variety of forms.

3. The flesh of all land and sea animals dried, and cut into very thin slices, gives a beautiful view of the various fibres, and their convolutions. The brain, the spinal marrow, and even the hairs of animals, exhibit different curiosities.

4. The human skin, by the help of the microscope, is found to be covered over with an infinite number of scales lying over one another, as in fishes; and it is probably the same in other animals. It has been computed that a grain of sand will cover two hundred of these scales.

5. All sorts of feathers, especially those of the peacock, afford a surprising view in the microscope. It is supposed that a single feather contains no less than a million of different parts.

6. Flies are found by the microscope to be produced from eggs laid by the mother, from whence they are hatched in the form of maggots, or small worms, which are afterwards transformed into aurelias, and these into perfect flies. This is the process most of the winged insects go through in their production. They have a great number of eyes fixed to their heads, so that they see on all sides around them, without turning their heads or eyes. A common fly is supposed to have eight thousand, and a grey drone fly no less than fourteen thousand eyes, with a distinct optic nerve to each; and each eye appears through the microscope, though magnified many hundred thousand times, more exactly shaped, and more curiously polished, than human art could finish an object as large as the whole cluster, containing seven thousand distinct ones. The wings of flies, especially of the moth and butterfly kind, are found to be contrived with admirable art, to answer their use, and with inimitable beauty and ornament. The dust, which sticks to the fingers, when we handle them, is found to be feathers; each of which has its quill and vane parts as complete as that of a fowl or a goose, and are inserted in the film of the wing, with the utmost regularity of arrangement. With the microscope, the stings of moths and bees appear to be instruments finished to the highest perfection; their points, and saw-like teeth being perfectly polished and sharp; whereas the edge of a razor appears like that of butcher's cleaver, and the point of a lancet like an iron spike just come from the anvil.

7. By the help of the microscope the innumerable and inconceivably minute animalcules in various fluids are discovered, of the existence of which we have no reason to suppose any mortal had the least suspicion, till last century. In the milt of a single cod-fish ten times more living creatures are contained, than the inhabitants

ancients,

antients, who imagined, that the whole race of insects were produced by heat and corruption, and had not the least suspicion of any living creature smaller than their naked eyes could perceive. Whereas we find by the help of that

of Europe, Asia, Africa and America, taking it for granted, that all parts of the world are as well peopled as Holland, which is very far from being the case. Of a certain species some are discovered so extremely minute, that it has been computed, three millions of them, or three times the number of the inhabitants of London and Westminster, would not equal the bulk of a grain of sand. Of animalcules, some species resemble tadpoles, serpents or eels, others are of a roundish or oval form, others of very curiously turned and various shapes; but in general they are extremely vigorous and lively, and almost constantly in motion. Animalcules are to be found (besides those in the bodies of animals) in the infusions of pepper, fenna, pinks, roses, jessamin, tea, raspberry stalks, fennel, sage, melons, four grapes, wheat, hay, straw, and almost all vegetable substances, in the water, that is in the shells of oysters, cockles, and other shell-fish, in the foulness upon our teeth, and those of other animals, in our skins, when affected with certain diseases; in vinegar, and paste, and so on infinitely. In each of these substances, when exposed to the air some time, multitudes of living creatures, beyond the reach of numbers, are discovered, of which many hundreds of species are already known, so different from one another as those of the largest animals, and very probably there are many more yet unknown. As it is certain, that in the above-mentioned fluids few or no animalcules are to be found, when covered from the air, but when open to the access of the air, their numbers are beyond reckoning; it is hardly to be doubted, but that either the air is replete with infinite multitudes of living creatures too small for sight, which come and deposite their eggs in places proper for the nutrition of the young, or that their eggs are floating every where in the air, and falling promiscuously every where, only those are hatched, or come to perfection, which fall upon places fitted for them, and the others perish. However it is, the countless numbers of those living creatures, the profusion of life every where to be observed, is above measure astonishing, and shews the Maker to be an infinite Being.

8. By the help of the microscope, we find that the scales of almost every different fish are different from those of others, in internal texture; and that all of them are wrought with surprising art and beauty.

9. By means of this noble instrument we find, that the seeds of almost all manner of vegetables contain in them the stamina of the future plant or tree, and that their production from the seed, and their growth to maturity is only the swelling and enlarging of the stamina by the addition of nutritious juices. It is probable the manner of production and growth of animals is analogous to this. The fertility of some plants is almost beyond belief. One particularly is said by naturalists to produce annually a million of seeds from one. The farina of flowers is found by the help of the microscope to be a regular organized body, and not a meer dust, as it appears to the naked eye, and is reasonably supposed to be necessary to fertility in plants and trees.

10. By the microscope have been discovered many singular properties of that most unaccountable of all creatures the polype, which is found at the bottom of ditches, and standing waters; whose manner of production, feeding, and digestion, are different from those of all other animals. The young ones come out of the sides of the old, like buds and branches from trees, and at length drop off perfect polypes. They do not seem to be of different sexes. They take in worms, and other sustenance, by means of a set of long arms or Antennæ, which surround their mouths, and after keeping them some time in their stomachs, throw them out again the same way. The animal's body consists of a single cavity, like a tube or gut, and what is wonderful, and almost beyond belief, is,

noble instrument (which is sufficient alone to furnish an inexhaustible variety of entertainment) that the smallest animalcule, as well as the largest beast of the field, is produced by parent animals, and that the different species or kinds of living creatures, whose minuteness renders them imperceptible to our naked eyes, are as numerous as those which are visible to our naked eyes. By this instrument we find, that the complex and various apparatus necessary to life can be crowded into a point; that an organized body may be put together, whose size is not equal to an atom; nay, that there are innumerable species of animalcules, which, when magnified a million of times, are still hardly discernible; that a few drops of some fluids contain more living creatures than there are men, women, and children now alive upon the face of the whole earth. By the help of this instrument we find, that the same hand, which with such wonderful accuracy poised and ballanced the magnitudes, distances and velocities of those immense bodies, the planets and comets, has likewise fashioned the inconceivably minute bodies of animalcules with such elegance

that it will live and feed after it is turned inside out, and even when cut into a great many pieces, each several piece becomes a complete polype. They are infested with a kind of vermin, as are almost all animals from the largest down to bees and other insects. These vermin sometimes in a long time will eat up the head and part of the body of a polype, after which, if it be cleared of them, it shall have the devoured parts grow up again, and become as complete as ever. Some polypes have around their mouths a sort of plume, which they whirl round, and making with it an eddy in the water, draw in their prey, and devour it.

11. By the microscope it is found, that neither the wood, the bark, the root, the leaves, the fruit, nor even the pith of the meanest vegetable is a mass of crude or indigested matter; but that every different species is different in its internal structure, and all curiously and delicately wrought. A bit of cork, cut extremely thin, a slice of oak or fir, or a bit of elder pith, in the microscope, are so many curious pieces of Mosaic work. Even a bit of charcoal or burnt wood appears with the microscope an admirable object.

12. By this instrument it is found, that what we call mouldiness upon flesh, leather, or other substances is no other than a great number of extremely small, but perfect plants, having stalks and tops like mushrooms, and sometimes an appearance of leaves. The seeds of these minute plants must, in all probability, be diffused universally through the air, and falling upon substances fit for their growth, spring up in astonishing profusion. There is, in short, no end of microscopic subjects. A sprig of moss, with the help of that instrument, is found to be a regular plant, consisting of a root, a stock, branches, leaves, &c. and naturalists tell us, there are some hundreds of different species of it. A bit of sponge before the microscope is a curious piece of net-work. Every different chemical salt has its parts differently figured. A leaf of a common stinging nettle, the head of a wild oat, the surfaces of some pebble-stones, a flake of snow, a few grains of sand, or almost any natural thing, with this instrument, exhibit exquisite beauties; while, on the contrary, the most delicate works of art, can by no means bear its examination; but degenerate before it into masses of irregularity, and deformity.

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OF THE CREATOR.

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and beauty, that the more they are magnified, and the farther they are examined, the more curious they are found to be; whereas on the contrary, the most exquisite works of human art owe their beauty to the imperfection of our sight, so that the finest needle with the microscope looks like a plowshare, a piece of silk like a mat, and the most delicate miniature picture like a rough-cast wall. The observation of the wonders of creating power in these minute objects, shews us, that He, who inhabits immensity and eternity, is absolute master of every point of space, and of every particle of matter in the universe, and pervades, actuates and invigorates all, exhibiting in an imperceptible point, as well as in an unbounded sphere, the perfections and attributes of an infinite God.

Thus great, thus good, thus wise, and thus powerful, or rather infinitely more great, more wise, more benevolent, and more powerful than all created imagination can conceive, is He, whom we ought to adore, to obey, to love, and to reverence with the best powers and noblest faculties of our souls, and before whom all the mighty potentates of heaven veil their glories, and worship at his footstool. After what has been said, in order to set forth something of the divine attributes of Goodness, Wisdom, and Power, we must own that these are only a part, and a very small part of his ways; the above not being the hundredth part of what is known of the greatness and excellency of the works of God; and what is known of them, being just nothing, when compared to what is beyond the reach of human understanding. But if, as we have seen, the Creator of the world has shewn himself so immensely kind and beneficent, as unasked, and without the least prospect of advantage, or addition to his own happiness, to produce an infinite number of creatures, with an infinite number of conveniences and advantages for their happiness, can we find in our hearts to offend so much goodness, to requite so much kindness with rebellion, and disobedience? Especially, can we carry our perverseness against the best of beings so far, as to neglect, or break through those very laws he has condescended to give us purely for our own advantage, for ennobling our natures, and improving us in those virtues and graces, which are absolutely necessary in their own nature to render us capable of happiness. And, if the infinite Majesty of heaven has condescended to provide for the meanest of his creatures, and has not thought any of them

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unworthy of his care, what pretence have we, who are ourselves but dust and ashes, to treat with neglect, or look with contempt upon any of our fellow-creatures, however a few accidental circumstances may set them at a little distance from us in this world? Or how can we justify ourselves in refusing any kindness in our power to our own flesh and blood, when we see such instances of the Divine Goodness to the very lowest of his creatures?

Again, have we seen a few out of innumerable instances of the most consummate wisdom of the supreme Being in his works of creation? That every the minutest part is wisely contrived to answer its proper end, and even various and seemingly contrary ends at the same time, and to become an useful member of the immense whole? Have we seen reason, from the slight view we have taken of the divine works, to conclude the great Author to be wise above all finite conception; and shall we be so weak as to dream of imposing upon him, or evading his all-seeing eye, and all-comprehensive knowledge? Can any imagination be more vain or more desperate, than for a weak, short-sighted mortal to think of outwitting infinite wisdom? For a creature, who is but of yesterday, to imagine it possible to get the better of his creator, who sees at one view all things, past, present, and to come? Or can we be so foolish as to imagine, that he, who could so wisely contrive and execute the grand design of an universe, has laid his schemes for the government of the moral world (for the sake of which he created the natural) so ill, as to suffer the disobedient and impenitent to escape finally unpunished?

Farther, have we considered a little the amazing effects of the divine power in the motions of those stupendous bodies the planets and comets, which, considering their huge unwieldiness, that they should be moved with such velocity, as some of them revolve with, if we are not astonished and startled at the thought of it, it is either because we have not duly considered it, or because we have no adequate ideas of it. And can we think of resisting or escaping such power? What should we be in the hands of one, who can wield those mighty masses of matter? Or rather, what is all human and angelic power together against omnipotence? Justly therefore does our Saviour direct us not to fear weak man, who can at worst, but kill the body; but to fear Him, who can finally destroy both soul and body in hell. Not to fear him, who thunders in the heavens above us, who shakes
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the earth under us *, who weighs the mountains in scales, and the hills in a ballance; not to dread the power, or to hope to avoid the reach of that arm, which launches those prodigious bodies with such rapidity through the sky; if this is not the very desperation of madness, nothing is.

Finally, have we seen that the creator and governor of the world, who inhabits immensity and eternity, is infinitely good, wise, and powerful! And do we know certain and infallible ways of gaining the approbation and friendship of such a Being? Do we know how to attain the happiness of having all this Wisdom, Goodness, and Power exerted for us? Do we know, that they, for whom infinite wisdom, goodness, and power are interested, must be happy beyond all imagination? Are we certain, that the righteous Judge of the World will not be finally indifferent to any of his crea-

* As we have, some weeks ago, felt the effects of Divine Power in a shock of an earthquake, and again another this very morning, *March the 3th*, a few hours before my writing this; and as we have reason to be thankful, these fearful phenomena very seldom alarm us of this part of the world; it may not be amiss to present such readers as are not acquainted with that part of natural philosophy, with the following very brief account of their supposed causes, &c.

The earth abounding universally with caverns and subterraneous passages, and its bowels being filled with great quantities of inflammable matter, it is no wonder, that their taking fire, and suddenly rarifying the air and vapours, that are pent up in those unseen regions, produces the same effects as gun-powder in a mine. There are several sorts of substances, which while separate, are cool and peaceable, but being put together, break out, some instantly, some more slowly, into smoke, fire, and flame. An imitation of an earthquake may be made by burying under ground a quantity of a paste made of sulphur and steel filings, which in a few hours will swell, and heave up the ground, and at last break out into smoke and flame. Volcano's, or burning mountains, are generally found in those parts of the world, which are subject to earthquakes, being the vents, or spiracles of the inflammable matter, which causes them; of which such quantities have been thrown out of mount *Ætna*, and others, as is astonishing to think of. Some of the most terrible earthquakes have been that in Sicily in the year 1692-3, which destroyed or greatly damaged fifty-four cities and towns, besides a great number of villages, particularly the city of Catanea, in which, of 18,914 inhabitants 18,000 were swept to one grave in a moment, and never more seen. In the whole island, about 60,000 of 244,900 people perished. In Jamaica, where they are very frequent, a most fearful one happened in the year 1692, which in two minutes swallowed up nine tenths of the town of Port Royal. The Earth opening swallowed people up in crowds, some of whom were thrown up in other places, some were squeezed to death by the closing earth, with their heads left above ground. Some whole plantations were removed a great way from their places. Ships in the harbour were overset and lost. The earth rolled like waves of the sea; and at the openings whole rivers of water spouted up. The whole was attended with horrible noises, as of falling mountains at a distance, and with an unsufferable stench, and the vapours which broke out, darkned the very Air. Mountains were pushed out of their places, and the course of rivers stopped by them. Almost all the houses in the island were thrown down, and a thousand acres of land sunk outright. At Lima 5000 people perished in an earthquake in 1637; besides a terrible one a few years ago; and there have been also some dreadful ones in New England, and other places too tedious to mention.

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...the power of a God, who will have
...in his own right, and the Power of a God, who will have
...the other; they, who are so
...and impatient, must expect the divine
...which we be moved against them, and even his
...to be kindled into wrath for their defiance
...we, I say, as free of all this as reason and reve-
...can make us, and shall we be so blind to our
...interest, as to let any consideration of either hope or
...of any thing in this World lead us to the neglect or
...of our duty, or withdraw our attention from
...the great end of our being, our future and final happiness?
...Whatever others do, let us of this enlightned nation resolve,
...after the example of the pious hero of scripture, that we and
...our houses will serve the Lord; since it will ever be found
...the highest wisdom, and the highest honour, as well as the
...indispensable duty, of all created beings, with the faithful
...seraph *Isid*, "to serve God ever blest, and his Divine
...Behests obey, worthiest to be obeyed."

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